selected to fill an important post in the new National Physical Laboratory at Tokyo on his return from Europe. His intelligence and charm of manner had gained him many friends both in this country and Japan, who deplore the untimely end of such a young life so full of promise of achievement in science.
E. R.

THE death of GEORGES HUMBERT on January 22 has removed a mathematician of exceptional powers. Humbert may be compared with Clebsch, because, although he may not have invented a new mathematical engine, he showed unexpected uses of those already provided. In his hands Abel's theorem and Poincaré's researches on Fuchsian functions became magic keys to unlock the treasures of geometry, and give us concrete and elegant images of analytical ideas. One of his most characteristic works is his memoir on hyperelliptic surfaces, for which he obtained the Bordin prize, and which was published in *Liouville's Journal*. In his later years he was attracted by the theory of numbers, and published several papers on arithmetical forms. Humbert gave lectures at the Ecole Polytechnique, and also at the Collège de France.
M.

Notes.

DR. H. K. ANDERSON, Master of Gonville and Caius College, Cambridge; Prof. W. M. Bayliss, professor of general physiology, University College, London; and Sir William H. Bragg, Quain professor of physics, University of London, have been elected members of the Athenæum Club under the provisions of the rule of the club which empowers the annual election by the committee of a certain number of persons "of distinguished eminence in science, literature, the arts, or for public service."

ON Monday last, March 14, the Albert medal of the Royal Society of Arts was presented to Prof. Albert Michelson, foreign member of the Royal Society, for his discovery of a natural constant which has provided a basis for a standard of length. The award was made last year, but the actual presentation was deferred until Prof. Michelson could come to England to receive it. In the absence of H.R.H. the Duke of Connaught, the president, the medal was presented by Mr. Alan Campbell Swinton, the chairman of the council of the society. By the use of his interferometer Prof. Michelson found the length of the Paris standard metre to be 1,553,164 times the wave-length of the red line of cadmium, and his calculations have since been verified as accurate within a limit of error of one wave-length, or say two-millionths of a millimetre. To the society the award is of especial interest, because in 1774 it offered a prize for an invariable standard of length, and up to the present date there has never been found a successful competitor. As the Albert medal is limited to practical applications of science, the society could not recognise any other of Prof. Michelson's scientific discoveries, but its council was doubtless influenced by an appreciation of their extent and value. His construction of optical gratings, determination of the velocity of light, and precise experiments on the relative motion of æther and matter are of fundamental importance, and his échelon spectroscope has provided physicists and astronomers with a most valuable instrument of high resolving power. Several years ago Prof. Michelson used his interferometer to measure the diameters of the four chief satellites of Jupiter, and suggested its application to the fixed stars. This has now been done at the Mount Wilson Observatory, and a short account of the remarkable results obtained was given in NATURE of January 20, p. 676.

THE magnetic research steamer *Carnegie*, of the Carnegie Institution of Washington, returned to San Francisco on February 22 after a scientific expedition to the Indian Ocean, West Australia, New Zealand, Tahiti, and Fanning Islands to investigate the magnetic condition of the earth over ocean areas. The only information as to the results of the voyage yet announced is that the Royal Company Island was sought for in vain. The Royal Company Island or Islands figured on charts of the Southern Ocean for more than a century, having been reported by the Spanish ship *Rafaelo* about 1776 in 49° S., 142° E. Bellingshausen in the Russian Antarctic Expedition appointed the island as a rendezvous for his two ships in January, 1820, but both vessels sought it in vain. Dumont D'Urville on the French Antarctic Expedition in 1840 also searched for the island, but could not find it; still, the name remained on the charts in various positions between 49° and 53° 30′ S. and between 141° and 145° E. The re-discovery of Bouvet Island by the *Valdivia* in 1898, after Cook in 1772 and 1775 and Moore in 1845 had passed within twenty miles without sighting it in their searches, re-awakened doubts as to the non-existence of other islands reported in the Southern Ocean and never seen again. Capt. J. K. Davis in the *Nimrod* of Shackleton's expedition in 1909, and again in the *Aurora* of Mawson's expedition in 1912, sailed over most of the assigned positions and got soundings of more than 2000 fathoms in the vicinity. The work of the *Carnegie* should be held to have completed the difficult task of proving a negative, and so to clear the chart of another iceberg.

THE *Daily Mail* of Saturday last, March 12, publishes a message from its Paris correspondent referring to a prediction by the Abbé Moreux that the next fourteen years will be relatively dry in Western Europe. The alternation of wet and dry periods of about seventeen years each referred to in the report, and in the short leading article upon it, is, however, by no means a new discovery. Indeed, a cycle of precisely the same length and type as that now announced was mentioned more than three hundred years ago by Francis Bacon, and in our own time Prof. E. Brückner, of Berne, has traced its effects in a variety of meteorological phenomena. The Abbé Moreux may have found a new weather-period, but what is described by the *Daily Mail* is nothing more than Brückner's cycle, which corresponds approximately to the length of three sun-spot periods.

THE Report of the Museum Committee of the Borough of Warrington deals with the four years ending June 30, 1920. In May, 1920, Mr. Charles Madeley, who had been director and librarian for forty-four years, died, and the opportunity was taken to separate the museum from the library and to provide each institution with an independent staff. This undoubtedly is a move in the right direction. The new keeper of the museum is Mr. G. A. Dunlop. The collections have received a number of accessions, among which those of local interest are predominant, and include many specimens collected and determined by the Lancashire and Cheshire Fauna Committee, notably 290 Diptera and 77 Hymenoptera obtained by Col. Fairclough in his own garden.

IN spite of difficulties connected with the delayed progress of the new building and the large amount of work entailed by the visit of the British Association, the thirteenth annual report of the National Museum of Wales records considerable progress in all departments. In the natural sciences and in archæology the museum is becoming, as it ought, the headquarters of investigation in the Principality. Thus Dr. Ethel Thomas, keeper of botany, has set going a primary vegetation survey of Wales in co-operation with field-clubs and school-teachers. Dr. Simpson, keeper of zoology, has started a faunistic survey of Glamorgan in conjunction with the Cardiff Naturalists' Society—an effort that is obviously capable of extension. The archæologists of Wales assembled in congress have expressed the opinion that all finds should be preserved in museums for the control and maintenance of which effective provision has been made, and that local museums should be affiliated to the National Museum.

THE Museum Journal of the University of Pennsylvania for September, 1920, contains a well-illustrated article by Dr. W. C. Farabee on several collections of ancient American gold objects that have lately come into the possession of the museum. These objects are of extraordinary interest in the development of art, and many of them are of great beauty. A number of Sumerian tablets, some of which were described by Dr. Stephen Langdon in 1917 as part of a law code, are here translated for the first time by Père V. Scheil, of Paris, and prove the existence of a code at least 1000 years before the famous code of Hammurabi (*circa* 2000 B.C.). Other articles deal with the gold treasure in the Temple of Baal at Nippur (1300 B.C.) and with ancient Peruvian textiles. The latter is illustrated by coloured plates. We may envy our American friends these treasures of art and learning, but a museum that makes its riches so promptly known in this interesting manner deserves to possess them.

THE study of soils as pursued in agricultural institutes deserves far more attention from geologists than it ordinarily receives. W. G. Ogg and J. Hendrick have made interesting experiments ("Studies of a Scottish Drift Soil," *Journ. of Agric. Sci.*, vol. x., p. 55) on the absorptive power for ammonia of powdered granite. The considerable result obtained is not dependent on the presence of weathered material, nor does the amount taken up increase as rapidly as the increase of surface due to finer powdering of the sample. When afterwards treated with water, the powdered granite behaves like a soil, since a part of the ammonia remains fixed, probably by adsorption, on the particles of the rock.

THE Norfolk and Norwich Naturalists' Society has recently published a new number of its Transactions (vol. xi., part 1). The issue includes Mr. J. H. Gurney's presidential address, Prof. Boswell's long and authoritative study of the surface and dip of the chalk in Norfolk, and the report of the Blakeney Point Committee. This report is excellent reading; for Blakeney Point throughout the war had its work of national defence, and good stories are told of quiet English men of science mistaken for spies, and of treasure-trove of wreckage washed ashore. Now the "military authorities" are gone, and the men of science are come back to the Point; as it is said by a writer of admirable prose but shockingly bad poetry: *Cedant arma togae: concedat laurea laudi.* We wish all success to this famous and hard-working society in this fifty-second year of its life; and to Dr. Sidney Long, who has done so much for its welfare.

IN a recent paper (*Journal of Genetics*, vol. x., No. 4) Prof. Punnett and the late Major P. G. Bailey publish some results on the inheritance of egg-colour and broodiness in poultry. The crosses were chiefly between Black Langshans on one hand and Brown Leghorns or Hamburghs on the other. Both broodiness and egg-colour were transmitted by the cock as well as by the hen. Although there is evidence of association between these two characters in inheritance, yet it is found to be possible to establish a non-broody race laying brown eggs. As regards egg-colour, F_1 birds laid eggs of an intermediate tint, and in F_2 there was segregation, with a series of intermediate tints as well as the pure white and dark brown grades. In the reciprocal crosses between Brown Leghorn and Langshan a great difference was found in the eggs laid by F_2 offspring, a preponderance of eggs approaching the colour of the eggs of the female parent in both cases. It is considered, however, that this may have been a coincidence owing to a difference in the composition of the Leghorn strain employed in the two crosses. Broodiness is found to be highly complex, birds sometimes showing the character in one year and not in another, F_1 hens from a cross being usually broody, while in F_2 the proportion of broody to non-broody birds shows great variation in different crosses, and the condition may be due to the action of more than one genetic factor.

ARTICLES V.-VII. in vol. xlii. of the Proceedings of the U.S. National Museum are by Mr. A. C. Kinsey, who writes on the American Cynipidæ or gall-wasps. These contributions are particularly welcome, as students of the family have been few, and there are still large areas of the world from which practically no collections have yet been made. The biological phenomena concerning these insects are of great interest, especially those bearing upon gall-production, parthenogenesis, and alternation of generations. In article v. the author adds sixteen species to those already known, and eight plates are devoted to portraying the particular types of galls produced by them. Article vi. is devoted to a summary of our knowledge of the life-histories of gall-wasps, together with notes on those of a number of American species. We hope the author will see his way at a future date to study their larvæ and the development of the galls in which the latter live. In article vii. are many interesting observations on the phylogeny and general biology of the family. The author tells us that 86 per cent. of the known species of gall-wasps affect Quercus, and are confined to that genus. Another 7 per cent. are confined to species of Rosa. The remaining 7 per cent. are found in plants belonging to various natural orders, and it is evident therefrom that 93 per cent. of the known Cynipidæ are restricted to two genera of plants only. Among other features a table is given of the proportions of the sexes which obtain in the various species. In some cases males are unknown, and in others the proportion of this sex to females varies from 1·5 per cent. in *Rhodites rosae* to 55 per cent. in *Aulacidea podagrae*. The author concludes that alternation of generations is a more or less extreme type of seasonal dimorphism, and is primarily due to seasonal environmental conditions.

According to the annual report on the Forest Administration of Nigeria for 1919, out of a total estimated forest area of 218,000 square miles only 3143 square miles have so far been permanently reserved as forest, though an additional area of 2558 square miles is in process of reservation; this will bring the area of reserved forests to 2·6 per cent. of the total estimated forest area and less than 1·7 per cent. of the total area of Nigeria. The Director of Forests urges with good reason the necessity for more rapid progress in the reservation of forests up to at least 25 per cent. of the total area of the country, the urgency being the greater from the fact that the forests are otherwise threatened with destruction by shifting cultivation. Scientific forest management is still in its infancy. There are no working plans, and meanwhile the forests are worked under a crude form of selection fellings regulated by a minimum-girth limit, this being the only method of treatment possible with the present small staff. Artificial regeneration has made some slight progress, and the Director of Forests is alive to the possibility, under suitable conditions, of raising plantations with the aid of shifting cultivation—a system found so successful in Burma. The chief timbers extracted are described as mahoganies and cedars, together with *Terminalia superba, Mitragyna macrophylla, Scottelia kamerunensis, Lophira procera,* and *Uapaca Staudtii.* Exports consisted almost entirely of mahogany, to the extent of 8516 logs valued at 115,820*l.*

A memoir on "North-Western Queensland," issued as Publication 265 by the Queensland Geological Survey (1920), describes a region of metamorphosed sediments, possibly Silurian, unconformably overlain by Jurassic strata with artesian water, and including important mines of copper and iron. A feature of the memoir is the use of colour in the geological sections, which adds very agreeably to their clearness, as Portlock and the earlier geologists realised in the palmy days of publication.

Now that the question of the relation of kame-mounds and eskers to ice-margins has been once more raised in the British Isles, attention may be directed to the study of the Newington Moraine of New England, extending across Maine, New Hampshire, and Massachusetts, by F. J. Katz and A. Keith (U.S. Geol. Surv., Prof. Paper 108–B). The gravels are sometimes bouldery and unsorted, sometimes well stratified, and the long ridge represents material graduating south-eastward into an outwash-plain of clay and deposited from an ice-front in the sea. Leda-clay sometimes overlaps the moraine material.

It is to be hoped that the new Egyptian Government will continue the series of informing publications now issued by the Geological Survey of Egypt under the Ministry of Finance. In Palæontological Series No. 4 M. R. Fourtau describes the Neogene Echinoderms, and is able to assure us that, thanks to collections made by Messrs. Madgwick and Moon and Hassan Effendi Saddek during the recent exploration of the petroliferous zone, this echinodermal fauna is now completely represented in the Cairo Museum. While the genera as a whole are of Mediterranean types, interesting additions occur which have hitherto been regarded as exclusively Indo-Australian. In the lithographed plates, executed in Paris, the large flattened or domed genera so characteristic of Miocene times are handsomely represented.

The report of the proceedings of the fourth International Meteorological Conference held in Paris from September 30 to October 6, 1919, has been rendered into English by the Meteorological Office, and is now published by the Air Ministry as Paper M.O. 239. As the last International Conference met so long ago as 1905, there was a wealth of new material to discuss. The meeting dealt with international meteorological organisation in all its branches; the present position of the science with regard to aviation, artillery, transport, and the physics of the air was reviewed, and codes for the transmission of observations on climatology and aerology were discussed. A number of commissions were deputed to report on the preparation of an international meteorological vocabulary and to supervise scientific investigations. Included in the report are nine appendices giving the minutes of meetings of the commissions appointed at the conference, a list of the sources from which the Meteorological Office in London has received data during the past ten years, and a note by M. Bjerknes on the projection and scale of charts.

The January issue of the Proceedings of the Cambridge Philosophical Society contains a summary by Dr. E. H. Hankin of the papers on flight which he has contributed to the *Aeronautical Journal* during the past ten years. Dr. Hankin has been able to study under exceptionally good conditions during his residence in India the circumstances which influence the soaring flight of birds, dragon-flies, and flying-fishes. In all cases the wings of the bird, dragon-fly, or fish are more nearly horizontal the faster the flight, and the speeds attained are very similar, *i.e.* from 5 to 10 metres per second for slow, and between 15 and 20 for fast, flight, whether of vulture, dragon-fly, or flying-fish. The regularity of the soaring flight of cranes in flocks disproves the theory which attributes it to chance air-currents. Both dragon-flies and flying-fish use their wings, legs, or abdomen as brakes during soaring flight, and this use discredits the theory that the flight is due to imperceptible wing movements, which, if they existed, the bird or fish could diminish at will. The horizontality of the wings disproves the side-current theory, while observations of soaring in the midst of aerial seeds or feathers which showed no irregularity of motion render the theory of turbulence untenable. Dr. Hankin thinks that direct observation requires to be supplemented by experiment before a satisfactory explanation of soaring flight can be furnished.

THE Collected Researches of the National Physical Laboratory (vol. xv.) is a reprint of eighteen papers dealing with physical, metallurgical, and engineering subjects which have appeared in the proceedings of scientific societies or in the technical Press during the years 1915–19. So many of these papers are of great value that it is difficult to select any one for special comment, but five by Dr. N. Campbell alone or in collaboration with Mr. C. C. Patterson illustrate so well the character of the scientific and industrial problems which the laboratory is called upon to solve that their nature may be indicated. They deal first with the present theory of the high-potential magneto, and show that it does not yet furnish a sufficiently firm basis on which to attempt improvements of the machine. They then consider the nature of the spark at the break in the primary of such a machine, and establish the fact that it is in reality an arc. Lastly, they deal with the effect of the spark discharge in igniting explosive mixtures such as those used in gas- and oil-engines, and show that the energy necessary to initiate an explosion is much less than that supplied in practice at the present time. At several points of the papers it is intimated that the research has been discontinued, and if this is the case it seems unfortunate for the gas-engine industry.

To facilitate the systematic testing of samples of dust from coal-mines made necessary by the Act of 1920, Messrs. A. Gallenkamp and Co. are supplying sets of apparatus (according to the designs of Mr. S. R. Illingworth, of the School of Mines, Treforest) which seem very well adapted for the purpose. The drying is effected in an oven, similar to that used by the U.S. Bureau of Mines, through which dry air is drawn so as to change completely the atmosphere round the samples every six minutes, the outer jacket containing water with 5 per cent. of glycerine. The roasting dishes are of silica with aluminium lids, and they are inserted at one end of an electric muffle furnace so wound that the temperature gradually increases from front to back to prevent the coking of the freshly introduced samples. The burnt samples are withdrawn from a door at the back after they have stood for some time at the full temperature of 800–850° C. The roasting dishes stand on silica slabs, by which they are pushed in and withdrawn from the furnace. A scheme of weighing and heating two batches of samples alternately is suggested whereby twenty-four samples might be analysed by one chemist in a working day; if the apparatus enables this to be done—and the suggestion appears to be feasible—it will certainly be an improvement on present practice. The scheme of tests does not include the determination of carbon dioxide in "carbonate" dusts. These dusts are coming into use, and a small addition to the apparatus for this purpose might be desirable.

MR. R. D. DUNCAN, of the Radio Engineer Signal Corps of the U.S. Army, contributes a valuable paper on "wired radio" to the Journal of the Franklin Institute for January. By "wired radio" is meant simply the use of high-frequency currents superposed on ordinary telephone or telegraph lines to transmit speech or signals without interfering with the normal working of the line. One of the reasons for originating this research in America was an attempt to utilise the large quantity of radio-telephone apparatus which had been purchased during the war. One advantage of this system is that speech distortion, which causes so much trouble in long-distance wire telephony, is practically eliminated. The attenuation also is much less than had been anticipated. A very interesting and important application of the method is for establishing communication with a train in motion. Experiments carried out on the New York Central Railway are described. The telephone conductors which run parallel to the railway track were used to carry the high-frequency currents, and at the fixed station the transmitting and receiving apparatus were connected between the aerial wire and the earth. In the moving train the apparatus was connected to a closed loop which was placed at the proper angle to the plane of the telephone wires. Employing this system and using a high-frequency power of only two watts, excellent telephony was obtained up to a distance of ninety miles. It was noticed that the signals received in the train varied periodically in intensity when it was in motion. This phenomenon was traced to the existence of "standing waves" on the telephone line.

Engineering for February 18 contains a communication from the Metropolitan-Vickers Electrical Co., Ltd., which gives an explanation of the causes leading to the breakdown of a new 15,000-kw. turbo-alternator at Dalmarnock Station, Glasgow. The insulation on the windings at one end of the machine took fire on December 8, and the whole insulation on this end was destroyed. Another generator was nearly ready, and was installed and set to work one week later. After running for a week sparks were seen issuing from the top of the stator frame, and the machine was shut down. Examination showed that one of the insulated bolts through the core had broken down near the end plate. These bolts pass through the core in an axial direction and serve to hold the end plates tightly against the laminations. Inspection of the bolts showed that vibration of a more or less serious nature had occurred on several of them. A series of tests revealed the fact that for the particular length and diameter of bolt used a relatively slight tension was sufficient to bring the frequency of the bolts to such a value as to synchronise with the frequency of the whole set, corresponding to the speed of 1500 r.p.m. Re-inspection of the first machine indicated that breakdown was due to the same trouble. A third machine with bolts of a modified design has been running since the end of December and has carried peak loads of 21,000 kw. The new type of bolt has a natural frequency very far below the running frequency of the machine.

IN the notice of a volume on "The Control of Parenthood" which appeared in NATURE for March 3 (pp. 5–6), the reviewer remarked that "Dr. Mary Scharlieb, the doctor of medicine, differs in emphatic terms from Dr. Marie Stopes, the doctor of science and philosophy." Dr. Stopes has written to express the opinion that these words will give readers the impression that Dr. Mary Scharlieb's "antagonism to birth-control methods is based on medically determined detrimental effects of specified methods," whereas she holds that "under cover of the title of doctor of medicine Dr. Mary Scharlieb voices a religious conviction." We would prefer not to devote space to the difference between these points of view, but among the passages upon which our reviewer founded his statement is one on pp. 105–6 of the book noticed, and we refer Dr. Stopes to this in justification of his remark. But surely she is hasty in thinking that readers of NATURE will read into the meaning of the sentence solely the medical aspects of the subject (which she claims were not decided by the evidence before the Commission). Is it not much more likely that some readers will, as is their wont, see less and some more than the words justify, whilst others will see simply the literal meaning?

STUDENTS of India and the Far East should be interested in the latest catalogue (No. 411) of Mr. F. Edwards, 83 High Street, Marylebone, W.1, which gives particulars of some 1133 books, engravings, and drawings relating to India, Afghanistan, Ceylon, Burma, Tibet, Central Asia, Persia, etc. The catalogue will be sent free by the publisher upon request.

Our Astronomical Column.

THE FIREBALL OF MARCH 2.—Mr. W. F. Denning writes that further observations of this meteor have been received from Mr. Thomas Dick, of Purley, Surrey, Mr. G. Merton, of Woldingham, Surrey, and an observer in Hertfordshire. Mr. Merton did not observe the fireball in flight, but noticed the illumination it caused. He was about to observe a star in his telescope when the whole inside of the observatory was lit up for a few seconds, and he rightly concluded that a large meteor had fallen. From a comparison of all the observations it appears that the radiant point was at about $176^\circ+24^\circ$, and that the height of the meteor declined from 77 to 34 miles along a path of 61 miles, traversed at a velocity of 20 miles per second. Further observations of an exact character of the apparent course of the meteor amongst the stars would be valuable. It is to be hoped that in future years special attention will be given by meteoric observers to the first few nights of March, for past experiences amply testify to a special abundance of fireballs at this period.

THE ROTATION OF VENUS.—The problem of the rotation period of our nearest planetary neighbour has proved to be one of the most baffling of astronomical enigmas. Before Schiaparelli's announcement that it always turned one face to the sun, its period was supposed to differ little from that of the earth. Since then astronomers have been fairly equally divided between supporters of the short and of the long period.

In the last few weeks Prof. W. H. Pickering, who has been observing the planet in the clear and steady air of Mandeville, Jamaica, has put forward a new solution. He claims to have fixed the period as sixty-eight hours, the axis of rotation lying very nearly in the plane of the orbit, with which it makes an angle of only 4° or 5°. Such a bizarre arrangement does not strike one as probable *a priori*, in view of the considerable tides which the sun raises on the planet. It prevails in the Uranian system, but the solar tides there are much feebler, since, *ceteris paribus*, they vary as the inverse cube of the distance from the tide-raising body. However, when Prof. Pickering's full evidence for his new period arrives it will be carefully studied, and will doubtless stimulate other observers to use their best endeavours to verify it.

A SIMPLIFIED CALENDAR REFORM.—In view of the difficulty of obtaining agreement on the vexed subject of calendar reform, the Rev. Emilio Fanfani, of Pavia, has published a pamphlet in which he reduces the proposed change to a minimum. His suggestion is to leave the lengths of the months the same as at present, but to put January 1, and in leap year February 29 also, outside the weekly reckoning, calling them simply New Year's Day and Leap Day. Thus the week-days would recur annually on the same calendar dates. The author further recommends that the present year 1921 should be taken as the standard, since Christmas occurs on a Sunday. Thus January 1, 1922, would be New Year's Day and January 2 Sunday, as in 1921. He further recommends the fixing of Easter on April 10, though this is not an essential part of his scheme.

This plan has the recommendation that the calculated dates of future astronomical events are unaffected, and no alteration of astronomical tables is involved. While it does not do all that calendar reformers desire, it is at least better than nothing, and would be a boon in fixing school terms, commercial transactions, the meeting of societies, etc.

Prof. Pio Emanuelli, of the Vatican Observatory, contributes a preface, in which he commends the project to the Commission on Calendar Reform constituted by the International Astronomical Union.